



Chapter 1: Generation Infrastructure

IEPR Workshop on Staff's Draft report

Preliminary Electricity and Natural Gas Infrastructure Assumptions

February 26, 2003

Dave Vidaver

Electricity Analysis Office

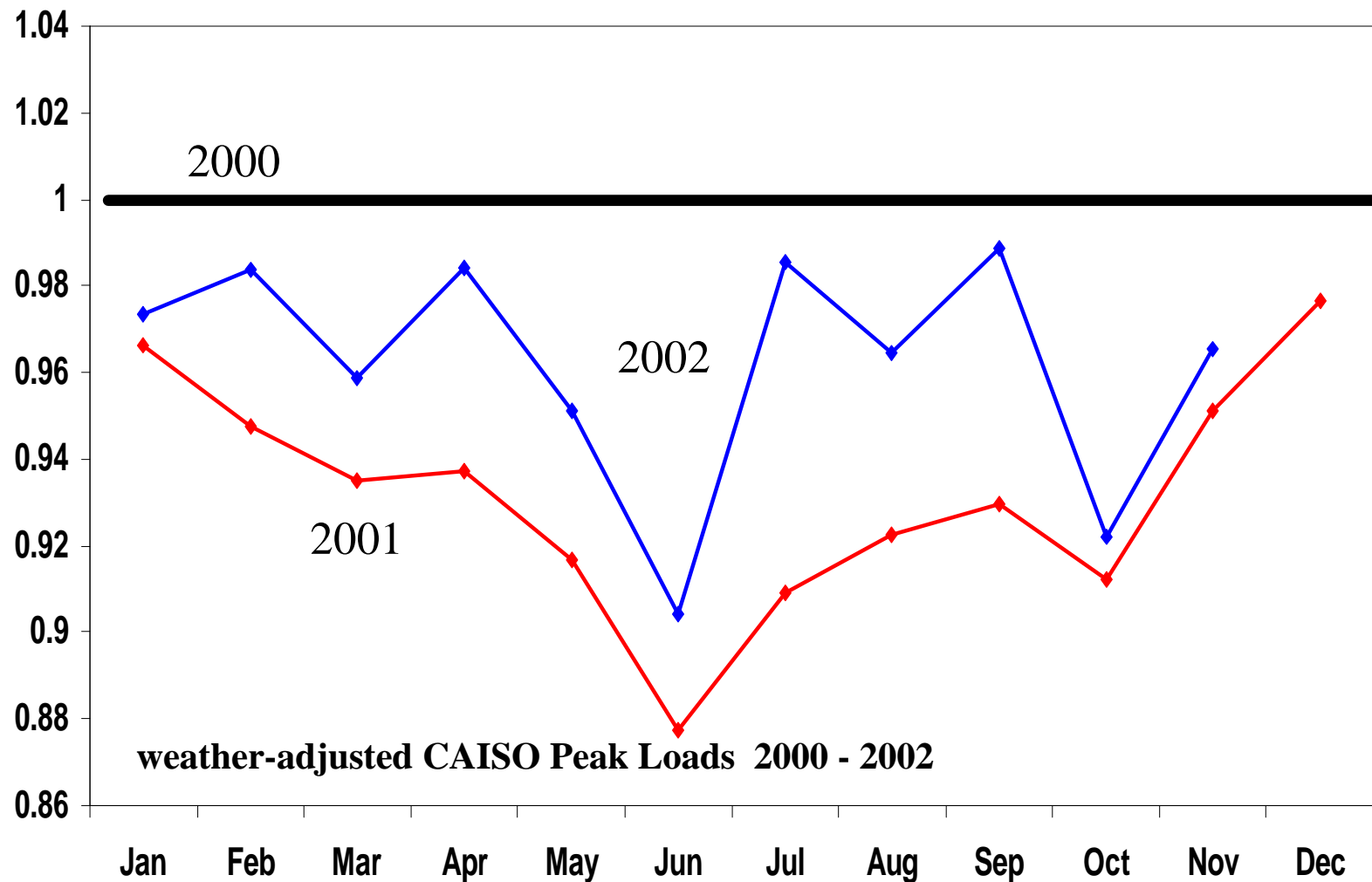


Overview

- Changes in resource adequacy during 2000 - 2003
- Current market conditions
- Likely changes in infrastructure during 2004 - 2006
- 2007 - 2013 ?
 - Uncertainties
 - Baseline projections
 - Scenarios & Sensitivities

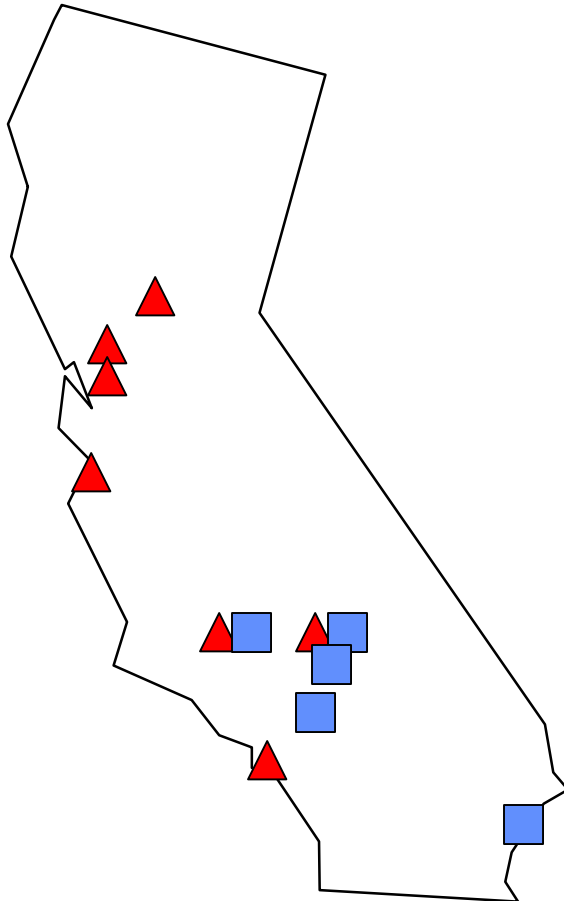


Peak Demand Has Fallen





New Generation 2000 - 2003

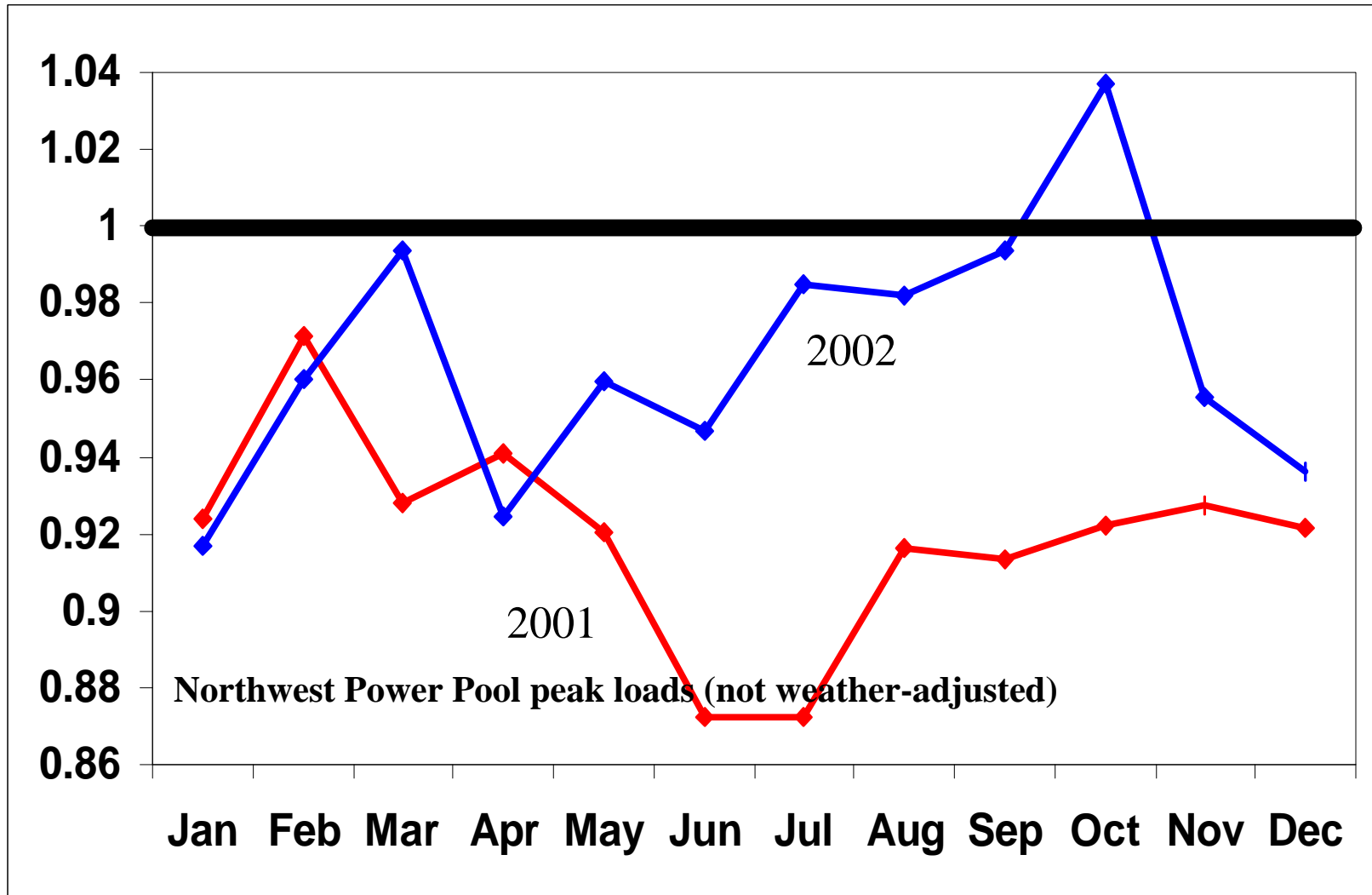


▲ Delta Energy Center	887
Sutter	540
Los Medanos	555
Moss Landing	1060
Sunrise I	320
La Paloma 1 & 3	562
Huntington Beach 3	225
<u>Other</u>	<u>1873</u>
Total	6022

■ Blythe	520
Elk Hills	500
High Desert	830
Sunrise II	240
La Paloma 2 & 4	562
<u>Other</u>	<u>722</u>
Total	3374

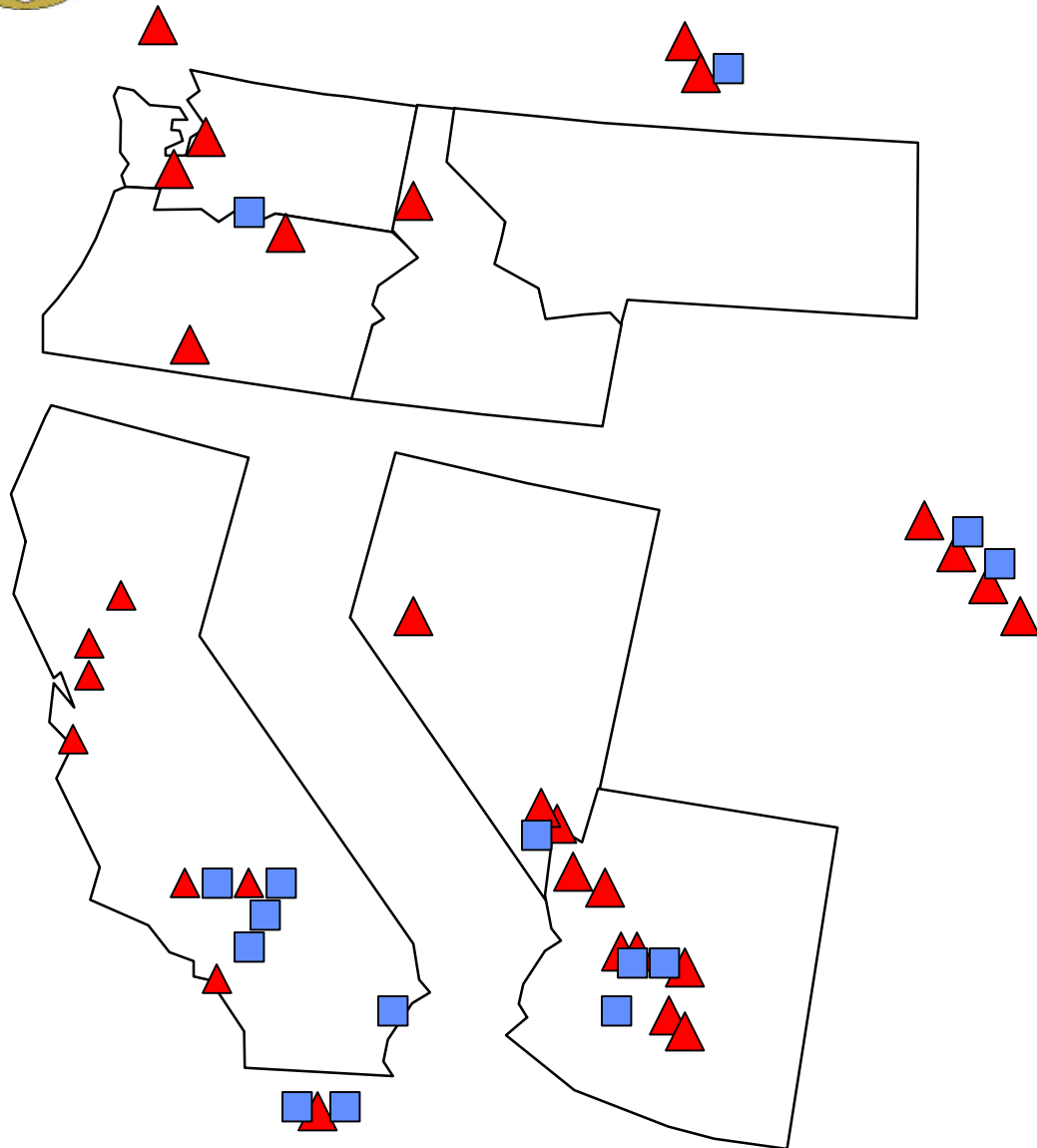


Northwest Loads Down





New Generation 2000 - 2003



New Generation by 8/03

Calgary EC	300
Front Range	480
Blue Spruce	310
Gila River	1060
West Phoenix	530
Mesquite	630
Apex	550
La Rosita	750
TDM	600
Goldendale	248
<u>Other</u>	<u>1191</u>
Total	6649

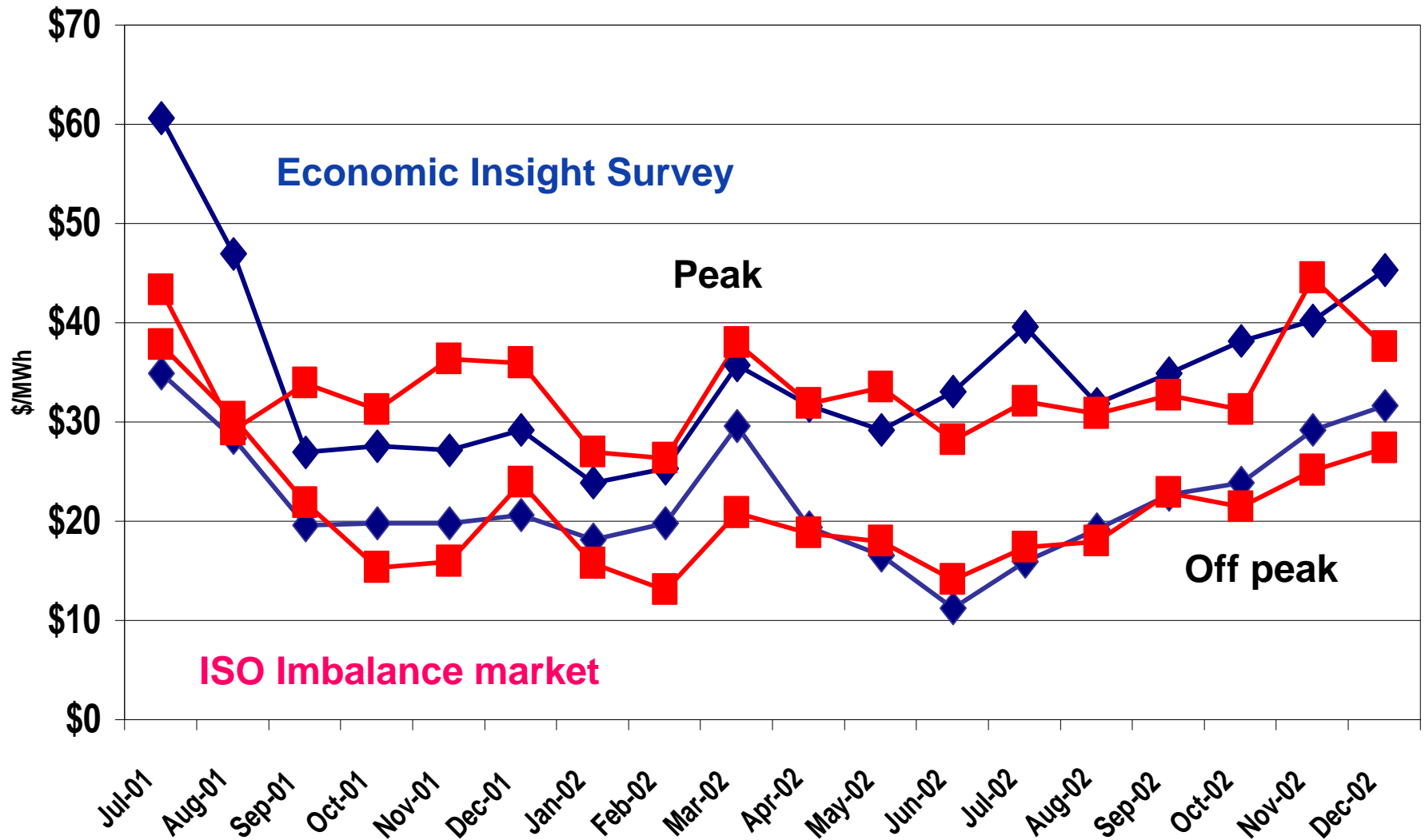


Increase in Reserve Margins

- Since 1999, capacity additions have outpaced peak load growth by 7,300 MW in California, and 8,700 in the combined Northwest and Southwest.
- Resources are adequate to ensure reliable, competitively-priced electricity through 2005.



Recent Spot Market Conditions



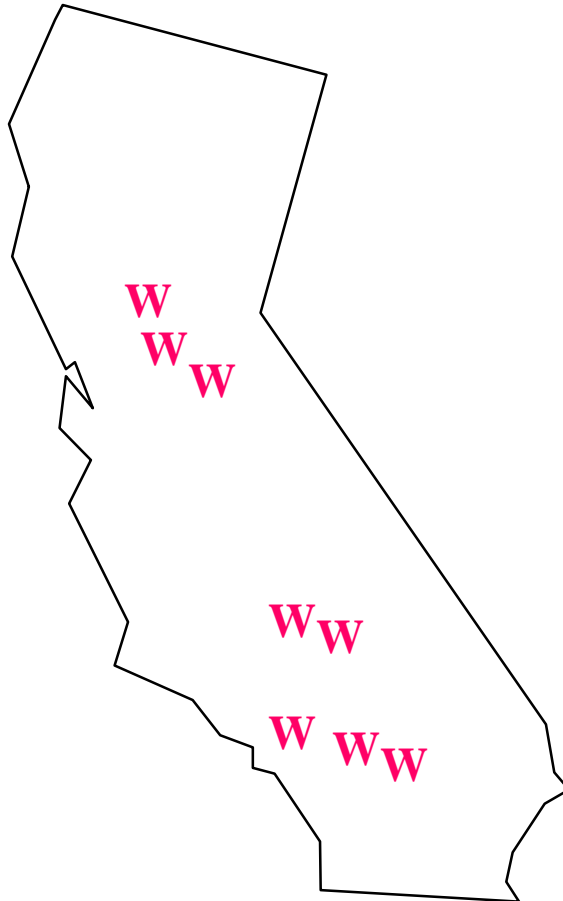


Reduced Exposure to Spot Market

	2003	2004
URG Thermal	5,291	5,291
IOU Hydro (derated)	5,000	5,000
QF (derated)	5,573	5,573
Must-take DWR contracts	7,066	7,696
Other contracts	1,075	1,075
Total Firm Capacity	24,005	24,635
DWR Dispatchable	5,934	5,133
Total Capacity	29,939	29,768
Coincident Peak Load	34,050	34,731
Residual Net Short	4,111	4,963



Cancellations

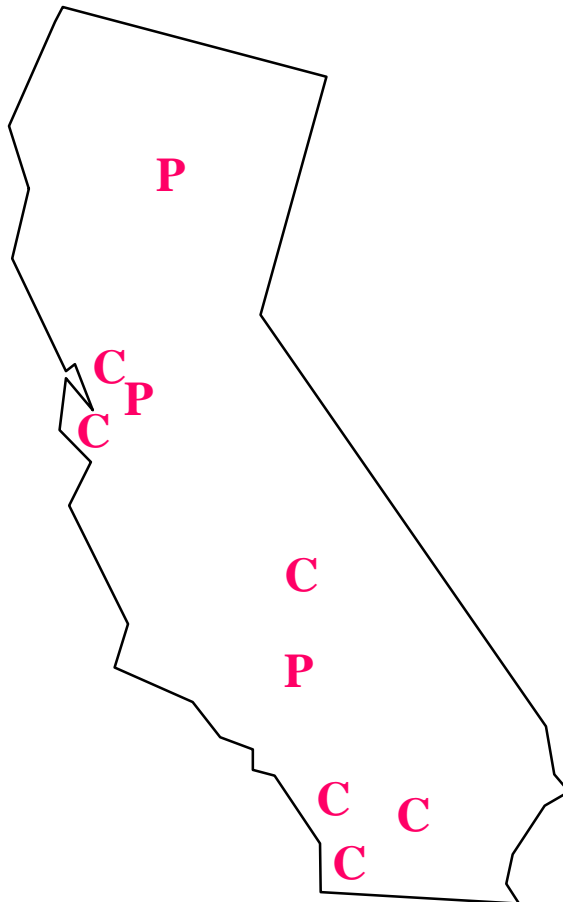


Withdrawn Since 7/01

Lancaster	240
Ocotillo	456
Nueva Azalea	550
Pastoria II	250
Colusa	500
Rio Linda	560
Roseville	900
South Star	200



Known Delays



Permitted/Under Construction

Pastoria I	750
Contra Costa	530
Otay Mesa	510
Mountain View	1056
Metcalf	600
Russell City	600
Three Mountain	500
Midway Sunset	500
Huntington Beach 4	225



A map of California with 15 red 'R' characters representing RBCs. The locations are approximately: 3 in the north-central region, 2 in the central-eastern region, 1 in the central-southern region, 1 in the south-central region, 1 in the southern region, 1 in the southeastern region, 1 in the southwestern region, 1 in the western region, 1 in the northwestern region, 1 in the central-western region, 1 in the central-southwestern region, 1 in the central-southeastern region, 1 in the central-southwestern region, 1 in the central-southeastern region, and 1 in the central-southwestern region.

El Segundo	630
Potrero	540
Golden Gate	570
Morro Bay	1200
East Altamont	1100
Inland Empire	670
SMUD II	500
Avenal	600
Tesla	1120
San Joaquin Valley EC	1087
Blythe II	520
Palomar	546



2004 – 2006 Baseline Additions

Unit Name	On line	MW	Owner
Valley LADWP CC	Oct-03	520	LADWP
Salton Sea 6	Dec-03	300	Cal Energy
Vernon GT 3	Apr-04	135	Vernon
Walnut CC	Dec-04	250	TID
Haynes Repower	Dec-04	575	LADWP
Kings River Peaker	Dec-04	90	KRWA
San Fran Airport	Jan-05	180	CCSF
Pico	Jan-05	147	Silicon VP
Magnolia CC	Mar-05	250	Burbank
Cosumnes	Mar-05	547	SMUD
Metcalf Energy	Jun-05	602	Calpine
MID Cogen	Dec-05	80	MID
Otay Mesa	Dec-05	580	Otay Mesa
Total		4256	



RPS Additions 2003 - 2006

Technology	MW	Capacity Factor
Biofuels	129	87%
Geothermal	115	87%
Wind	767	33% - 38%

- A share of 2006 target assumed to be met with existing resources
- Annual output from new resources

2005 2,567 GWh

2006 4,603 GWh



2004 – 2006 Baseline Retirements

Unit Name	Retire	MW	Owner
Valley 1-4	Jul-03	513	LADWP
Grayson GT	Jul-03	18	Glendale
Haynes 4	Nov-03	222	LADWP
Alamitos GT	Dec-03	147	AES
Etiwanda 5	Dec-03	141	Reliant
Olive 3 & 4	Jan-04	56	Burbank
Magnolia GT	Jan-04	22	Burbank
Mohave	Dec-03	915	SCE/LA
Haynes 3, derates	Sep-04	304	LADWP
Hunters Point 1 & 4	Jan-06	219	Mirant
Total		2557	



San Francisco & San Diego

San Francisco

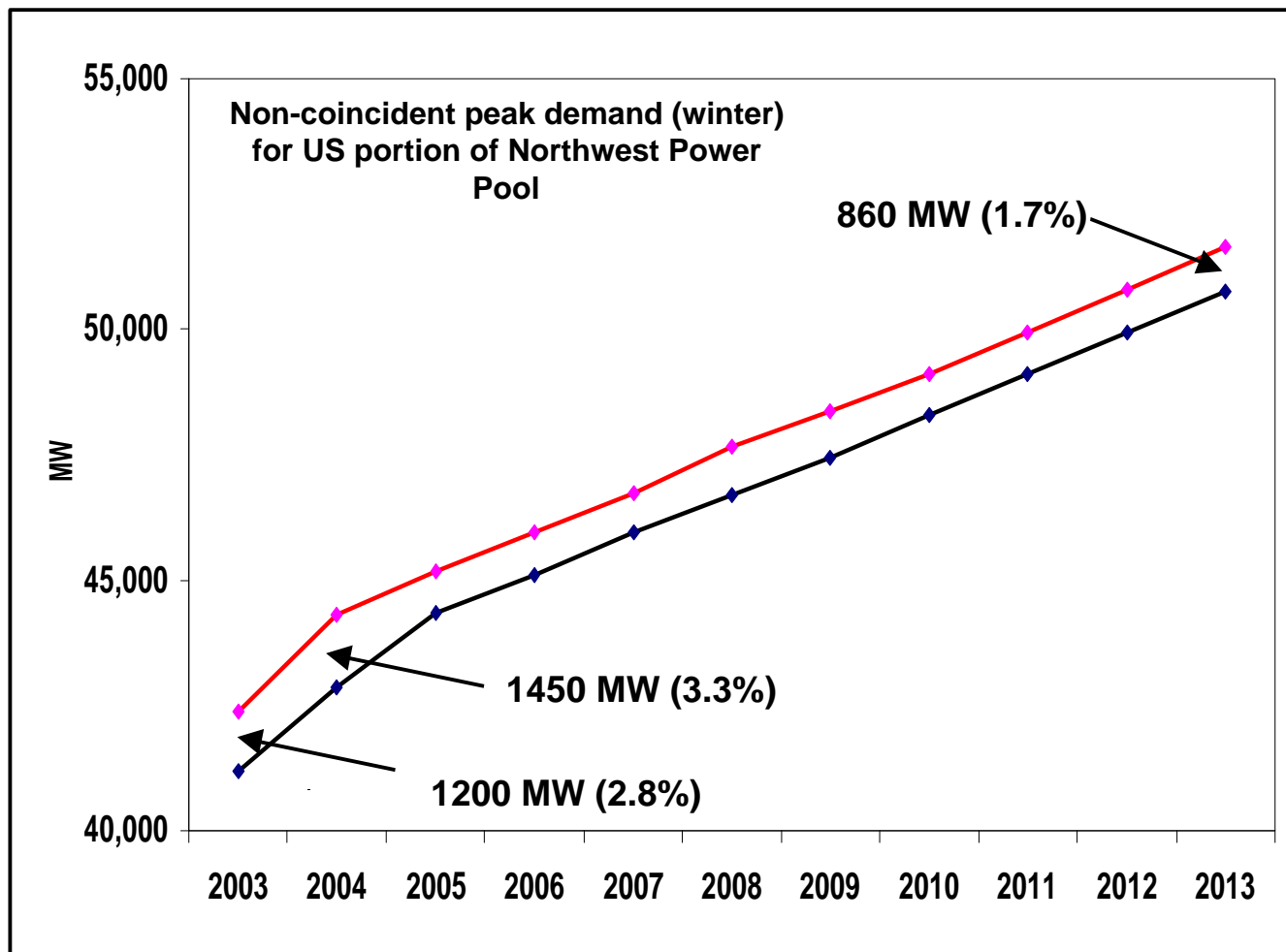
- 1/05 - add 180 MW of peakers
- 1/06 - increase Jefferson-Martin TTC by 400 MW
- 1/06 - retire Hunters Point 1 & 4
- 1/09 - add 250 MW

San Diego

- 1/05 - increase Mission - Miguel TTC by 500 MW
- 12/05 - add Otay Mesa (580 MW)
- 1/09 - Increase S of SONGS TTC by 750 MW
- 1/09 - add 415 MW (net of South Bay retirement)



Lower Demand in Northwest



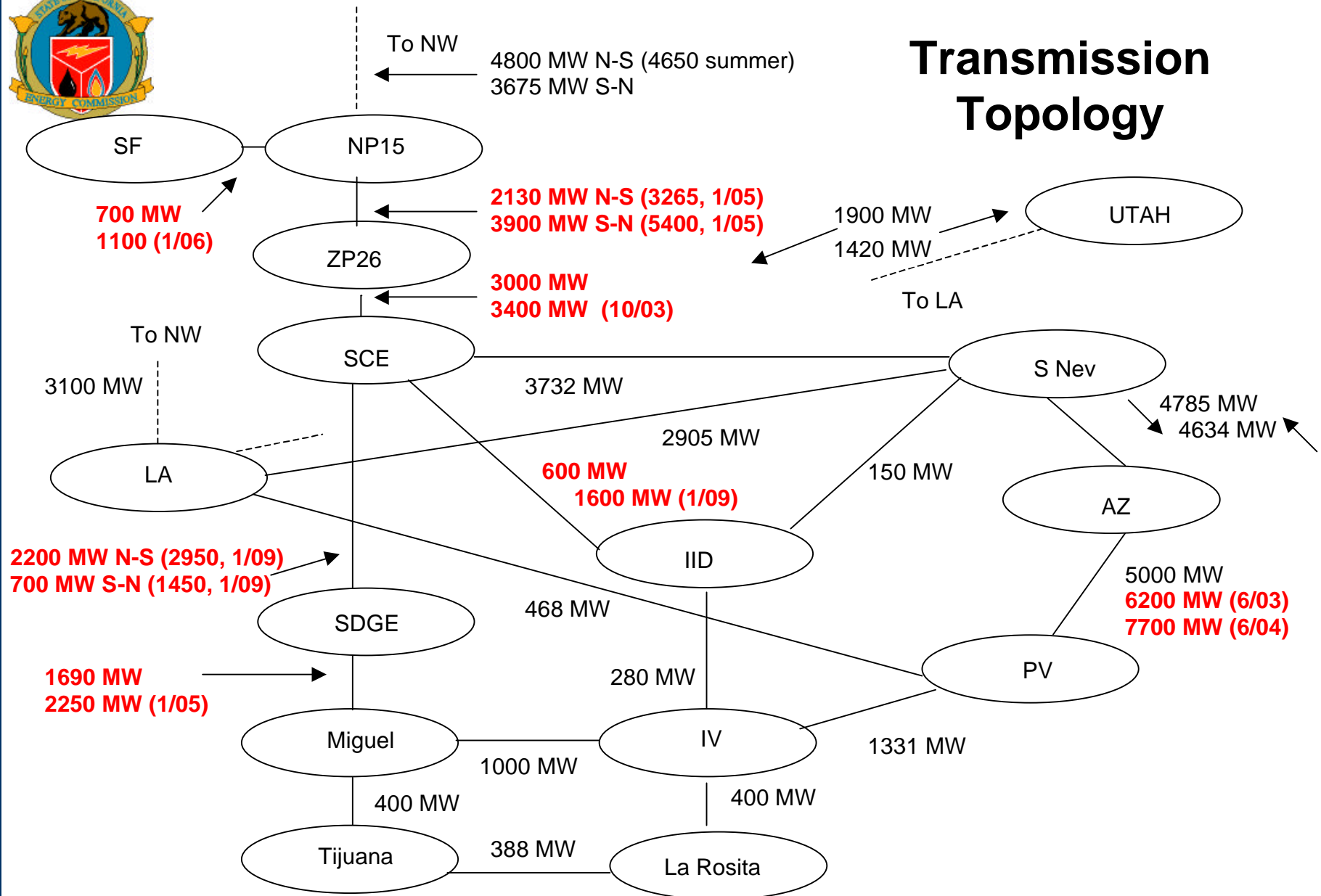


Remainder of WECC Additions 2004 - 2006

Northwest	On Line	MW
Edmonton Cogen	Sep-03	30
Pincher Creek	Oct-03	37
Bonanza Upgrade	Jan-04	80
First Megawatts CC	May-04	240
Genesee	Dec-04	450
Total		837
Southwest		
Gila River	Aug-03	1060
Reliant Bighorn	Oct-03	580
Pyramid Power Plant	Oct-03	152
Mesquite CC	Jan-04	625
Santan CC	Jun-05	825
Total		3242
Mexico		
TDM CC	Aug-03	600
Rockies		
Rocky Mountain EC	May-04	601
Remainder WECC Total		5280



Transmission Topology





RPS Additions 2003 - 2013

Technology	Total MW	Share NP 15	GWh 2013
Biofuels	645	48%	4,918
Geothermal	843	12%	6,421
Wind	2,263	37%	7,136
Total			18,475



Additions 2007 -2013

- Use estimation of revenue streams at the facility level to determine additions and retirements?
 - Ignores risk associated with not having long-term contract for output
 - Presumes price volatility estimates from model are accurate
 - Does not consider revenue from ‘non-energy’ markets
 - Ancillary Services
 - RMR
 - Capacity payments
 - Simplifies retirement decision



Additions 2007 -2013

- Assume additions and retirements provide desired level of reliability
 - Implicitly assumes that if market does not yield desired amount of capacity *cum* reliability, regulatory oversight and intervention assure it.
- Assume reliability is adequately indicated by reserve margins
 - Propose to use margins of 1998 - 1999 as a target



California Additions 2007 - 2013

	NP15	SCE	ZP26	San Diego	SF	IID/IV	Total
2007		150					150
2008		500					500
2009	250	150	500	415	250		1,565
2010	150	250					400
2011	150	250	250				650
2012	400	150					550
2013	0	250					250
Total	950	1,700	750	415	250		4,065

* During twelve months prior to July 1st



Out-of-State Additions 2007 - 2013

	Southwest	Baja California	Northwest	Rockies	Total
2007			620		620
2008			1,090		1,090
2009	150		1,120		1,270
2010	150	250	1,450		1,850
2011	150		920	150	1,220
2012	150	250	920	400	1,720
2013	680		1,710	150	2,540
Total	1,280	500	7,830	700	10,310

* During twelve months prior to July 1st



Not So Loose Ends

- How should new additions be allocated between baseload and peaking capacity?
 - As share of peaking capacity is increased, capacity factors for combined cycles rise. Staff proposes using this criterion as a basis for allocation.
- Staff does not retire aging capacity during 2007 - 2013. Some plants will be retired, how should this be modeled?
 - Select less efficient steam turbines expected to operate at low capacity factors, replace with necessary amount of gas turbines (or equivalently, repower steam turbines, substitute gas turbines for share of new combined cycles)?



Scenarios

- Fewer additions, faster load growth in 2004 - 2006, possibly with adverse hydro conditions (2006 or 2007)
- High and low natural gas prices (2003 - 2013)
- Adverse hydro conditions, booming economy (2007, 2010, 2013)
- Reduced renewable capacity, additional gas-fired generation (2007 - 2013)
- Slower load growth, less capacity additions, reflecting increased efficiency, self-generation (2004 - 2013)



Questions

1. Staff proposes to use the assumption that the selected plants being considered by municipal utilities to reduce spot market exposure will be built in a timely fashion. Should this assumption be revisited if simulations reveal that spot market prices will be at competitive levels?
2. Staff proposes to use the assumption that two of the three proposed generation projects that the State has established “step in” rights will be built, coming on-line roughly one year after the contractual deadlines for completion. Should this assumption be changed?
3. Staff proposes to use the assumption that reserve margins in California and the remainder of the WECC will gradually return to their 1999 levels. This is based on the assumption that regulators will compensate capacity investments to ensure at least this level of reserves. Is this a reasonable proposal?



4. Given that California's fleet of power plants is aging and that many of these facilities are owned by merchant generators, should staff be concerned that some of this capacity may be retired before new replacement generation can be brought online? What criteria should be used to develop a retirements assumption?
5. Staff proposes to use the assumption that a number of planned transmission upgrades that are needed to deliver power from areas with surplus generation capacity will be developed. These areas include Baja California, the Imperial Valley and Palo Verde. Staff also proposes to use the assumption that upgrades needed to deliver power into major load pockets take place. These upgrades include San Francisco, San Diego and Phoenix. Are these transmission upgrade assumptions reasonable? What other electric transmission projects are necessary to maintain grid reliability in the next 10 years? What electric transmission projects could provide economic benefits to California in the next 10 years?



6. Staff will evaluate the implications that the Renewable Portfolio Standard (RPS) targets may have on the need for other new generation capacity to meet load and implications to the natural gas infrastructure. What alternative levels of RPS development should staff consider to conduct a risk analysis of the electricity and natural gas system?
7. Staff assumes a specific set of renewable resource additions to meet RPS targets. Are these realistic assumptions?